UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

ENVIRONMENTAL RESTORATION PROGRAM

EXPLANATION OF SIGNIFICANT DIFFERENCES
OPERABLE UNIT 6

FINAL

MARCH 2007

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
OPERABLE UNIT 6

Elmendorf AFB

Prepared for:

3rd Civil Engineer Squadron/Environmental Restoration
and
Air Force Center for Environmental Excellence

Contract No. F41624-03-D8613/TO 0147
Project No. FXSB20057315A

March 2007

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LEAD AGENCY ACCEPTANCE
OF THE EXPLANATION OF SIGNIFICANT DIFFERENCES,
ELMENDORF AIR FORCE BASE, OPERABLE UNIT 6

This signature sheet documents the United States Air Force acceptance of the Explanation of Significant Differences for Operable Unit 6 at Elmendorf Air Force Base.

William M. Corson

WILLIAM M. CORSON
Colonel, United States Air Force
Director, Installations and Mission Support

15 Jun 07

Date

ACCEPTANCE
OF THE EXPLANATION OF SIGNIFICANT DIFFERENCES,
ELMENDORF AIR FORCE BASE, OPERABLE UNIT 6

This signature sheet documents the United States Environmental Protection Agency acceptance of the Explanation of Significant Differences for Operable Unit 6 at Elmendorf Air Force Base.

Daniel D. Opalski, Director
Office of Environmental Cleanup
United States Environmental Protection Agency
Region 10

8-30-2007
Date

SUPPORT AGENCY ACCEPTANCE
OF THE EXPLANATION OF SIGNIFICANT DIFFERENCES,
ELMENDORF AIR FORCE BASE, OPERABLE UNIT 6

This signature sheet documents the Alaska Department of Environmental Conservation acceptance of the Explanation of Significant Differences for Operable Unit 6 at Elmendorf Air Force Base. This decision may be reviewed and revised in the future if new information indicates the site may pose an unacceptable risk to human health, safety, or welfare, or to the environment.

JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

Aug 13 2007
Date

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LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFB	Air Force Base
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CEB	Community Environmental Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ESD	Explanation of Significant Differences
FFA	Federal Facilities Agreement
HVE	high-vacuum extraction
HVOC	halogenated volatile organic compound
IRIS	Integrated Risk Information System
lbs	pounds
LUC(s)	Land Use Control(s)
µg/L	micrograms per liter
MCL	Maximum Contaminant Level
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
ROD	Record of Decision
SVOC	semivolatile organic compound
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

SECTION 1

INTRODUCTION

1.1 PURPOSE

This Explanation of Significant Differences (ESD) documents refinements to the original remedy at Operable Unit (OU) 6 at Elmendorf Air Force Base (AFB), Alaska. OU 6 is composed of three former landfills (LF02, LF03, and LF04), two sludge disposal pits (SD15 and WP14), a surface disposal area around a rock testing laboratory (SD73), and a former storage bunker (SS19).

The Record of Decision (ROD), signed by the United States Environmental Protection Agency (USEPA) on 4 December 1996, by the Alaska Department of Environmental Conservation (ADEC) on 2 January 1997, and by the United States Air Force (USAF) on 27 January 1997, presents the selected remedial actions for OU 6 (Elmendorf AFB, 1997). This ESD updates the selected remedial actions based on data collected during remedy implementation and was prepared in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Chapter 40 of the Code of Federal Regulations (40 CFR) Sections 300.435(c)(2)(i) and 300.825(a)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

1.2 LEAD AND REGULATORY AGENCIES

The USAF is the lead agency for remedial actions at OU 6. USEPA Region 10 and ADEC were also signatories to the ROD and have agreed to the significant changes included in this ESD.

1.3 SUMMARY BASIS FOR ESD

Since the ROD was signed in 1997, data collected during remedy implementation, regulatory updates, and updated United States Air Force (USAF) guidance form the basis for this ESD. Specifically:

- Operation of the High-Vacuum Extraction (HVE) system at SD15 was ongoing since 1996. During that time, over 10,000 pounds (lbs) of contaminant mass has been removed. However, over 99 percent of that mass was removed during the first four years of operation. Since this time, mass recovery has steadily declined to a point where the HVE system is no longer effective. This ESD allows operation of the HVE system to be terminated and shifts focus to the next phase of the remedy at SD15 in the ROD – Monitored Natural Attenuation (MNA).

- During preparation of the ROD, a risk-based ground water cleanup level for 1,1,2,2-tetrachloroethane of 0.43 micrograms per liter (µg/L) was established because there was no available federal or state ARAR. Since the ROD was signed, a cleanup level of 4 µg/L was established in Alaska Administrative Code of Regulations (AAC) 18 AAC 75.345. This ESD establishes 18 AAC 75.345 as a chemical-specific Applicable or Relevant and Appropriate Requirements (ARAR) for LF02 and SD15 which results in a new cleanup level for 1,1,2,2-tetrachloroethane.

- In 2003, the USAF published guidance for active installations regarding Land Use Control (LUC) (also known as "institutional controls") documentation in administrative documents such as the ROD. LUCs are part of the selected remedy in the ROD for five of the seven sites at OU 6. This ESD uses the 2003 guidance to clarify how the USAF intends to implement the LUCs at sites LF02, LF03, LF04, SD15, and WP14.

1.4 ADMINISTRATIVE RECORD

This ESD will become part of the Administrative Record for Elmendorf AFB, as required by Section 300.825(a)(2) of the NCP. The Administrative Record is available for public review at:

Alaska Resources Library & Information Services (ARLIS)
University of Alaska, Anchorage Consortium Library
3211 Providence Drive
Anchorage, AK 99508
(907) 272-7547

SECTION 2

OVERVIEW OF OPERABLE UNIT 6

Elmendorf AFB was proposed for the National Priorities List (NPL) in 1989 and placed on the NPL in August of 1990. In November of 1991, a Federal Facilities Agreement (FFA) was negotiated between the USAF, USEPA, and ADEC. The FFA established a procedural framework and schedule for all CERCLA activities conducted on Elmendorf AFB. Twenty-nine disposal/source areas were identified and organized into seven OUs on the basis of geographic proximity and similar source characteristics or contaminants.

OU 6 consists of seven different source areas (Figure 2.1). Three of the source areas are former landfills (LF02, LF03, and LF04), two of the source areas are sludge disposal pits (SD15 and WP14), one of the source areas is a surface disposal area (SD73), and the last source area was a bunker used to store pesticides prior to disposal (SS19).

Past landfill and waste management practices as well as leaking fuel distribution system lines are the primary sources of contamination in OU 6. The landfills were closed in the early 1970s and surface disposal of fuel waste has not been conducted since 1983. Active fuel distribution lines are still in use, but have undergone integrity testing to ensure they are not leaking. An underground storage tank and contaminated soils in the vicinity of pump house building 30-790 (near LF04) were removed in 1996. The pump house was also removed from service at that time. A records search pertaining to Source Area SS19 indicates no spills or releases occurred in this area.

The selected remedies in the ROD for OU 6 address the associated risks by active measures to reduce contamination below cleanup levels and LUCs to prevent exposure to contamination above cleanup levels. The major components for the selected remedies, which address the principal threats posed by conditions within the OU 6 source areas, are presented in the following sections.

2.1 SOURCE AREA WP14 – ORIGINAL REMEDY

2.1.1 Groundwater

- Institutional controls on land and water use, as specified in the Base Comprehensive Plan, will restrict access to the contaminated groundwater throughout WP14. Installation of wells in the contaminated plume for residential, industrial, and agricultural use will be prohibited by the Base Comprehensive Plan until cleanup levels have been achieved.

- Groundwater will be monitored as indicated by the Basewide Monitoring Program Well Sampling Decision Guide (Decision Guide) in Appendix A (frequency changed by the Memorandum to the Site File [Elmendorf AFB, 2003]) and evaluated on an as-needed basis to determine contaminant migration and to track the progress of contaminant degradation and dispersion, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.

- Recoverable quantities of free product found on top of the water table at WP14 will be regularly removed during groundwater monitoring events.

- Groundwater monitoring will be discontinued if contaminant levels are below cleanup levels during two consecutive monitoring events. In that case, no further action for groundwater will be required.

- During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements.

- All groundwater is expected to be cleaned up within 14 years.

2.1.2 Soil

- No further action will be required for soil at WP14.

2.2 SOURCE AREA LF04 – ORIGINAL REMEDY

2.2.1 Groundwater (North/Beach)

- No further action is required for the groundwater at LF04 North/Beach.

2.2.2 Groundwater (South)

- Access to groundwater at LF04 South will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF04 will maintain this designation indefinitely.

- Groundwater will be monitored and evaluated as indicated by the Decision Guide in Appendix A (Elmendorf AFB, 2003) to determine contaminant migration and to track the progress of contaminant degradation and dispersion, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an

evaluation of any changed site conditions, as long as contamination remains above cleanup levels.

- Recoverable quantities of free product found on top of the water table at LF04 will be regularly removed during groundwater monitoring events.

- Groundwater monitoring will be discontinued if contaminant levels are below cleanup levels during two consecutive monitoring events. In that case, no further action for groundwater will be required.

- During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements.

- All groundwater is expected to be cleaned up within 14 years.

2.2.3 Soil (North/Beach)

- Access to soil at LF04 North/Beach will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. As a former landfill, LF04 will maintain this designation indefinitely.

- No further action is required for soil contamination at LF04 North/Beach; however, landfill debris on the beach from LF04 will be removed annually as the specific remedy for this area.

- The removal of debris will include all LF04 landfill material that has fallen onto the beach and can be reasonably collected for disposal, as well as debris on the bluff slope or other low lying areas which can be accessed and removed without hazard.

- Hazardous materials encountered during the annual removal events will be handled according to appropriate regulations.

- The removal of debris from the beach at LF04 is expected to continue annually for 30 years or as long as the landfill remains subject to erosional action by tides. Five-year reviews will assess the protectiveness of the remedial action, including an evaluation of any changed site conditions.

2.2.4 Soil (South)

- No further action is required for the soil at LF04 South.

2.3 SOURCE AREA SD15 – ORIGINAL REMEDY

2.3.1 Perched Aquifer Groundwater

- Institutional controls on land and water use, as specified in the Base Comprehensive Plan, will restrict access to the contaminated groundwater throughout SDl5. Installation of wells in the contaminated plume for residential, industrial, or agricultural use will be prohibited by the Base Comprehensive Plan until cleanup levels have been achieved.

- Groundwater in the perched aquifer at SD15 will be treated by HVE and MNA to remove fuel related contaminants and halogenated volatile organic compounds (HVOCs).

- Recoverable quantities of free product found on top of the water table at SD15 will be removed through the HVE process.

- Treated water will be reinjected into the subsurface beyond the boundary of the contaminated aquifer. Reinjected water will be regularly monitored to ensure it meets cleanup and risk requirements.

- Groundwater with contaminant concentrations remaining above cleanup levels will continue to be monitored and evaluated as indicated by the Decision Guide in Appendix A (Elmendorf AFB, 2003) to determine contaminant migration and to track the progress of the HVE treatment, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.

- When two consecutive groundwater monitoring events indicate contaminant concentrations are below cleanup levels, the HVE system will be shut off. Semi-annual monitoring will continue for another year, and subsurface soil samples will be collected. If levels are confirmed to be below cleanup levels one year after the system is shut off, no further remedial action will be required. If contamination is present in any of the samples, the system will be restarted, or another remedial option will be considered.

- During the final round of groundwater monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs and arsenic. These results will be evaluated before a final decision is made that groundwater meets all cleanup requirements.

- All groundwater is expected to be cleaned up within five years.

2.3.2 Deep Aquifer Groundwater

- No further action is required for the deep aquifer groundwater.

2.3.3 Soil

- Shallow soils (less than five feet deep) with contamination above cleanup levels will be excavated, removed, and thermally treated to eliminate fuel-related contaminants. After treatment, no further action will be required for the shallow soils. Shallow soils will be included in the HVE extraction treatability study as indicated by the Memorandum to the Site File (Elmendorf AFB, 2003).

- Deep soils at SD15 will be actively treated through air stripping associated with the HVE process described for the perched aquifer groundwater.

- Soils with contamination above cleanup levels will be sampled one year after HVE system start up and every three years thereafter to evaluate contaminant migration and timely reduction of contaminant concentrations by HVE. If cleanup levels are not being achieved, further remedial action will be evaluated. This will include five-year reviews to assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.

- When two consecutive groundwater monitoring events indicate contaminant concentrations are below cleanup levels, the HVE system will be shut off. Semi-annual monitoring will continue for another year, and subsurface soil samples will be collected. If levels are confirmed to be below cleanup levels one year after the system was shut off, no further remedial action will be required. If contamination is present in any of the samples, the system will be restarted, or another remedial option will be considered.

- All soils are expected to be cleaned up within five years.

2.4 SOURCE AREA LF02 – ORIGINAL REMEDY

2.4.1 Groundwater

- Access to groundwater at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF02 will maintain this designation indefinitely.

- Groundwater will be monitored as indicated by the Decision Guide provided in Appendix A (Elmendorf AFB, 2003) and evaluated on an as-needed basis to determine contaminant migration and to track the progress of contaminant degradation and dispersion, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.

- Groundwater monitoring will be discontinued if contaminant levels are below cleanup levels during two consecutive monitoring events. In that case, no further action for groundwater will be required.

- During the last round of groundwater monitoring, samples will be collected and analyzed for all constituents that exceeded Maximum Contaminant Levels (MCLs) during the 1994 investigation, including volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements.

- All groundwater is expected to be cleaned up within 23 years according to the original remedial design estimates (Elmendorf AFB, 1997).

2.4.2 Soil

- Access to soil at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. As a former landfill, LF02 will maintain this designation indefinitely.

- A limited soil cover will be applied in three areas with elevated lead concentrations at LF02. This will eliminate the pathway for contact with the lead contamination. Five- year reviews will be conducted to evaluate the integrity of the cover, evaluate impacts from any changed site conditions, and assess the continued protectiveness of this remedial action.

- Landfill debris on top of or protruding from the ground surface at LF02 will also be removed as part of the specific remedy for this area.

- Hazardous materials encountered during the removal event will be handled according to appropriate regulations.

- No further action will be required as a means of closing the LF02 landfill.

2.5 SOURCE AREA LF03 – ORIGINAL REMEDY

2.5.1 Groundwater

- Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF03 will maintain this designation indefinitely.

2.5.2 Soil

- Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF03 will maintain this designation indefinitely.

2.6 SOURCE AREA SD73 – ORIGINAL REMEDY

2.6.1 Groundwater

- No further action is required for groundwater.

2.6.2 Soil

- No further action is required for soil.

2.7 SOURCE AREA SS19 – ORIGINAL REMEDY

2.7.1 Groundwater

- No further action is required for groundwater.

2.7.2 Soil

- No further action is required for soil.

SECTION 3

BASIS FOR THE SIGNIFICANT DIFFERENCES

3.1 DISCONTINUING HIGH-VACUUM EXTRACTION AT SD15

Operation of the HVE system at SD15 has been ongoing since 1996. During the past nine years, over 10,000 lbs of contaminant mass has been removed. However, over 99 percent of that mass was removed during the first four years of operation as illustrated in Figure 3.1. Since 2001, only 60 lbs of contaminant mass has been recovered, while costs to operate and maintain the system has remained relatively constant.

As stated in the *2004 Annual Technical Report - Environmental Monitoring and System Optimization of SD15 High Vacuum Extraction System* (Elmendorf AFB, 2005), mass recovery has steadily declined to a point where the HVE system has reached its technological limit and is no longer effective at removing contaminants (Elmendorf AFB, 2005). These conclusions were supported by the USEPA in correspondence dated 23 March 2005 (USEPA, 2005) and ADEC in correspondence dated 2 March 2005 (ADEC, 2005).

During 1996 debris and concrete pads were removed and disposed of at a local land reclamation area. Shallow contaminated soils were excavated, taken to Alaska Soil Recycling, and recycled in a low temperature thermal desorption unit. After treatment, the soils were returned to SD15 and used as backfill material.

In 2004 the addition of SVE wells to the HVE system successfully cleaned up the remaining soil contamination at SD15. No other areas of soil contamination are known to exist in which any COCs exceed remediation goals at SD15.

Based on the conclusions above, this ESD shifts focus from HVE to a phase using MNA to reduce remaining contaminant concentrations in the perched groundwater at SD15. The use of MNA is appropriate given the low concentrations of contaminants remaining above MCLs. After nine years of HVE system operation only benzene and TCE remain at concentrations above MCLs in groundwater. From August 1994 (prior to system operation) to August 2003 benzene concentrations decreased from 1,430 micrograms per liter (µg/L) to 0.88 µg/L at OU6MW-18. Over the same time period TCE concentrations decreased from 143 µg/L (OU6MW-18) to 6.6 µg/L. The maximum benzene and TCE concentrations in groundwater during the most recent sampling event were 100 µg/L and 13 µg/L, respectively (OU6MW-17).

The evidence summarized in Appendix B suggests that the concentrations of benzene and TCE will continue to decrease over time even without the HVE system due to the process of dispersion, dilution, volatilization, and biodegradation. TCE and benzene

decay rates range from 0.047 to 0.26 per year and 0.17 to 0.58 per year, respectively. Comparison of TCE and benzene attenuation rates at SD15 with ranges of decay rates for other sites, including other sites at Elmendorf AFB, indicates that the SD15 attenuation rates are on the low end of the reported ranges.

Using the decay rates noted above, MCLs for benzene and TCE are expected to be reached across the site by approximately 2012 based on the attenuation rates calculated (Appendix B). Based on the studies conducted, MNA is expected to achieve the MCLs in approximately the same time period as HVE at $1M-$2M (non-discounted dollars) less cost. However, the time to reach MCLs is approximate. Monitoring will continue until two consecutive groundwater monitoring events are below MCLs. During the monitoring period, special attention will be given to whether adequate organic carbon is present to support continued removal of TCE via reductive dechlorination. If necessary, a contingency plan discussed in Appendix B could be tried to achieve cleanup goals.

Monitoring will continue until the groundwater samples are below MCLs for two consecutive annual sampling events. During the remedial and monitoring period, special attention will be given to whether adequate organic carbon is present to support continued removal of TCE via reductive dechlorination. If conditions warrant, USAF may conduct a Treatability Study or apply information learned from other treatability studies at Elmendorf AFB to test the possibility of anaerobic bioremediation or other treatment. After a treatability study, the USAF will prepare an ESD or ROD amendment, as appropriate, if a new remedial method is proposed.

The use of MNA is not considered a fundamental change to the remedy because natural attenuation and the monitoring of those processes (i.e., MNA), was contemplated as part of the selected remedy for perched aquifer groundwater at SD15 in the ROD. The description of the selected remedy (Alternative G4) included a monitoring approach that would track the progress of contaminant attenuation in the aquifer (see reference to Alternative G2 description for WP14 in Section 2.4.2 of the ROD). The monitoring and processes associated with natural attenuation have been ongoing from the start of remedial action at SD15. Natural attenuation has been and will continue to be a part of the selected remedy.

3.2 REVISED REMEDIATION GOAL FOR 1,1,2,2-TETRACHLOROETHANE AT LF02 AND SD15

During preparation of the ROD, a risk-based ground water cleanup level for 1,1,2,2-tetrachloroethane was established because there was no available federal or state ARAR. At SD15, cleanup of 1,1,2,2-tetrachloroethane was considered to be complete when all other VOCs have met there MCLs. At LF02, a risk-based level of 0.43 µg/L was established as the cleanup goal based on protection of drinking water based on a 1×10^{-6} excess cancer risk.

This revised cleanup level is less stringent for LF02. However, no substantive changes to the remedy are expected as a result of the change to the cleanup level for 1,1,2,2 tetrachloroethane because the selected groundwater remedy at LF02 continues to include restrictions on land, groundwater use, and well drilling.

Groundwater monitoring frequency at SD15 and LF02 will be determined by the Decision Guide and reviewed at five-year reviews until contaminant levels are below cleanup levels for two consecutive monitoring events. In addition, the samples taken during the last round of groundwater monitoring will be analyzed for 1) all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals (see Table 3.1) and 2) any new chemical of concern established during subsequent five year reviews. Five year reviews will be accomplished in accordance with Section 19.1 of the Elmendorf Federal Facility Agreement, dated September 19, 1991. This will ensure the groundwater meets all cleanup requirements and the remedy is protective.

3.3 CLARIFICATION OF LAND USE CONTROLS

In 2003, the USAF published guidance for active installations entitled *Air Force Policy on Performance-Based Records of Decision (RODs) for Land Use Control (LUC) Implementation (SAF/IE Memo, 7 Oct 03)* (USAF, 2003) requiring documentation of LUCs in administrative documents such as the ROD. LUCs are part of the selected remedy in the ROD for five of the seven sites at OU 6. This ESD uses the 2003 guidance to clarify how the USAF intends to implement the LUCs at sites LF02, LF03, LF04, WP14, and SD15 (see Section 4.3).

SECTION 4

DESCRIPTION OF SIGNIFICANT DIFFERENCES

4.1 DISCONTINUING HIGH-VACUUM EXTRACTION AT SD15

This ESD changes the conditions when operation of the HVE system can be discontinued and when the focus can be shifted to MNA of the site. Currently, language in the ROD states:

> "*When two consecutive groundwater monitoring events indicate contaminant concentrations are below cleanup levels, the high-vacuum extraction system will be shut-off. Semi annual monitoring will continue for another year, and subsurface soil samples will be collected. If levels are confirmed to be below cleanup levels one year after the system was shut-off, no further remedial action will be required. If contamination is present in any of the samples, the system will be restarted, or another remedial option will be considered*."

Operation of the HVE system will now be discontinued when it is no longer effective as demonstrated by minimal contaminant removal rates or when cleanup levels have been achieved. After operation of the HVE system has been terminated, monitored natural attenuation will be used to reduce groundwater contaminant concentrations to below cleanup levels if necessary. Monitoring will continue for another year once cleanup levels have been achieved as verified through groundwater sampling. If levels are confirmed to be below cleanup levels, no further remedial action will be required.

Based on the data presented in Section 3.1, HVE system operations can be terminated at this time. Monitoring the contaminant plume and natural attenuation parameters, which has been ongoing during HVE operations, will continue until the groundwater cleanup goals are reached. Details regarding MNA's potential at SD15 and plan for implementation are provided in Appendix B. The information in Appendix B summarizes and evaluates monitoring data collected to date, and outlines a MNA implementation strategy. The implementation strategy includes a contingency plan should MNA not meet the cleanup goals. Performance of MNA at SD15 will be evaluated by collecting groundwater samples for VOCs on an annual basis. As this new data becomes available, trend analysis will be performed on Benzene and TCE to evaluate progress toward meeting the cleanup objective and the need to implement contingencies.

The change in remedy is expected to reduce operation, maintenance, and monitoring costs in the future (approximately $200K per year for 5 to 10 years). However, it should be noted that costs to date (approximately $1.5M non-discounted dollars) have exceeded

the initial remedy estimate in the ROD by 50 percent. The change in remedy will not affect the final outcome contemplated in the ROD for SD15. Cleanup goals stated in the ROD are expected to be achieved. However, the ROD originally stated that groundwater would be cleaned-up in five years (approximately 2002). Groundwater cleanup standards are now expected to be met at all wells by 2015. The protectiveness of the remedy remains unchanged.

4.2 REVISED REMEDIATION GOAL FOR 1,1,2,2-TETRACHLOROETHANE AT LF02 AND SD15

At SD15, cleanup of 1,1,2,2-tetrachloroethane was considered to be complete when all other VOCs have met their MCLs because no ADEC regulatory standard existed for 1,1,2,2-tetrachloroethane. At LF02, a risk-based level of 0.43 µg/L was established as the cleanup goal because no regulatory standard existed.

This revised cleanup level is less stringent for LF02. However, no substantive changes to the remedy are expected as a result of the change to the cleanup level for 1,1,2,2 tetrachloroethane because the selected groundwater remedy at LF02 continues to include restrictions on land, groundwater use, and well drilling.

Groundwater monitoring frequency at SD15 and LF02 will be determined by the Decision Guide and reviewed at five-year reviews until contaminant levels are below cleanup levels for two consecutive monitoring events. In addition, the samples taken during the last round of groundwater monitoring will be analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals (see Table 3.1) and 2) any new chemical of concern established during subsequent five year reviews. Five year reviews will be accomplished in accordance with Section 19.1 of the Elmendorf Federal Facility Agreement, dated September 19, 1991. This will ensure the groundwater meets all cleanup requirements and the remedy is protective.

The change in remedy is not expected to reduce operation, maintenance, and monitoring costs in the future. The change in remedy will not affect the outcome contemplated in the ROD for SD15 or LF02. Time to reach groundwater cleanup goals at LF02 is not expected to change. The protectiveness of the remedy remains unchanged.

4.3 CLARIFICATION OF LAND USE CONTROLS

LUCs are an integral part of the selected remedy at OU 6. The LUCs are designed to prevent activities that could affect the performance of the other components of the selected remedy, prevent the migration of contaminants in contaminated soil and groundwater, and maintain current land uses at the particular sites to protect human health and the environment. This ESD clarifies the LUCs at the individual sites and describes how the LUCs will be implemented and maintained.

LUC performance objectives have not changed significantly from the ROD. The LUC objectives for each each site are as follows:

- Source Area WP14 - groundwater. Institutional controls on land use and water use, as specified in the Base General Plan, will restrict access to the contaminated groundwater throughout WP14. Installation of wells in the contaminated plume

for residential, industrial, and agricultural use will be prohibited by the Base General Plan.

- Source Area LF04 - groundwater (South). Access to groundwater at LF04 South will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use of contaminated groundwater.

- Source Area LF04 - soil (North/Beach). Access to soil at LF04 North/Beach will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence.

- Source Area SD15 - perched aquifer groundwater. Institutional controls on land and water use, as specified in the Base General Plan, will restrict access to the contaminated groundwater throughout SDl5. Installation of wells in the contaminated plume for residential, industrial, or agricultural use will be prohibited by the Base General Plan.

- Source Area LF02 – groundwater. Access to soil at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use of contaminated groundwater.

- Source Area LF02 – soil. Access to soil at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use of contaminated groundwater.

- Source Area LF03 – groundwater, Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the

shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use of contaminated groundwater.

- Source Area LF03 – soil. Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use of contaminated groundwater.

The following maps/figures show the boundaries of the required land and groundwater use controls:

- For Source Areas WP14 and LF04 South Land Use Control Boundaries for Groundwater - Figure 4.1
- Source Area LF04 North Land Use Control Boundaries for soil - Figure 4.2
- Source Area SD15 Land Use Control Boundaries for groundwater - Figure 4.3
- Source Area LF02 Land Use Control Boundaries for groundwater and soil - Figure 4.4
- Source Area LF03 Land Use Control Boundaries for groundwater and soil - Figure 4.5

The Air Force is responsible for implementing, monitoring, maintaining, reporting on and enforcing the identified controls. If the Air Force determines that it cannot meet specific LUC requirements, it is understood that the remedy may be reconsidered, and that additional measures may be required to ensure the protection of human health and the environment.

4.3.1 Land Use Controls Implementing Actions

Specific measures have been and will be implemented to restrict access and limit exposure and use of contaminated groundwater and soil as required by site-specific LUCs identified in Section 4.3. These measures include the inclusion/documentation of LUCs in the Base General Plan, maintaining existing administrative controls through reviews of work clearance permits, and periodic inspections of the site, as described below.

The Air Force commits to notify EPA and ADEC in advance of any changes to internal procedures that would affect LUCs and their implementation.

4.3.1.1 Base General Plan

The Base General Plan will include the specific LUC objectives identified in Section 4.3, the current land uses and allowed uses of the site, and the geographic LUC boundaries. The Base General Plan will contain a map illustrating the locations of LUCs

at OU 6 and the associated LUCs for each area. The Base General Plan will be updated to reflect changes outlined in this ESD within 6 months of signing the ESD. The Air Force will notify USEPA and ADEC 30 days prior to making any land use changes that are inconsistent with land use control objectives or the selected remedy.

4.3.1.2 Base Administrative Procedures

Separate controls are in place and enforced by the Air Force to prevent inappropriate soil and groundwater exposure at OU 6. The Air Force currently requires all projects resulting in soil disturbance of greater than 4 inches below grade surface (bgs) to follow Wing Instruction 32-1007 (*Safeguarding Utilities from Damage*). This instruction requires the proponent to obtain an approved Work Clearance Request (3 WG Form 3) from the 3rd Civil Engineer Squadron. The Air Force will ensure that these procedures are complied with and maintained. At OU 6, no permit shall be issued for any activity that creates exposure or potential exposure inconsistent with the assumptions underlying remedy selection or would allow changes in land use inconsistent with use restrictions.

4.3.1.3 Monitoring and Reporting

Monitoring of the environmental use restrictions and controls will be conducted annually by the Air Force. The monitoring results will be included in a separate report or as a section of another environmental report, if appropriate, and provided to the USEPA and ADEC. The annual monitoring reports will be used in preparation of the Five Year Review to evaluate the effectiveness of the remedy.

The annual monitoring report, submitted to the regulatory agencies by the Air Force, will evaluate the status of the LUCs and how any LUC deficiencies or inconsistent uses have been addressed. The annual evaluation will address whether the use restrictions and controls referenced above were communicated in the deed(s), whether the owners and state and local agencies were notified of the use restrictions and controls affecting the property, and whether use of the property has conformed with such restrictions and controls.

4.3.2 Modification/Termination of Land Use Controls

The Air Force shall not modify or terminate LUCs, implementation actions, or modify land use without prior approval from USEPA and ADEC. The Air Force shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.

4.3.3 Duration of Land Use Controls

Land Use Controls at LF02 (soils and groundwater), LF03 (soils and groundwater), LF04 (soils and groundwater), WP-14 (groundwater), and SD-15 (perched aquifer groundwater) will be maintained until the concentrations of hazardous substances in the soil and groundwater are at such levels to allow for unrestricted use and exposure.

4.3.4 Property Transfer

The Air Force will provide notice to EPA and ADEC at least six (6) months prior to any transfer or sale of any part of OU 6 affected by LUCs so that EPA and ADEC can be

involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify EPA and ADEC at least six months prior to any transfer or sale, then the facility will notify EPA and ADEC as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to LUCs. In addition to the land transfer notice and discussion provisions above, the Air Force further agrees to provide EPA and ADEC with similar notice, within the same time frames, as to federal-to-federal transfer of property. The Air Force shall provide a copy of executed deed or transfer assembly to EPA and ADEC.

4.3.5 Discovery of Activities that Interfere with the Effectiveness of LUCs

Any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs will be addressed by the Air Force as soon as practicable, but in no case will the process be initiated later than 10 days after the Air Force becomes aware of the breach.

The Air Force shall provide notice to USEPA and ADEC as soon as practicable but no later than ten days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any action that may interfere with the effectiveness of the LUCs. The Air Force will notify EPA and ADEC regarding how the Air Force has addressed or will address the breach within 10 days of sending EPA and ADEC notification of the breach.

4.4 SUMMARY COMPARISON OF ORIGINAL AND PROPOSED REMEDY

The following provides a side-by-side comparison of the original remedy in the ROD and the changes found in this ESD.

Record of Decision Component	**Explanation of Significant Differences Component**
Source Area WP14	
Groundwater	
Institutional controls on land use and water use, as specified in the Base Comprehensive Plan, will restrict access to the contaminated groundwater throughout WP14. Installation of wells in the contaminated plume for residential, industrial, and agricultural use will be prohibited by the Base Comprehensive Plan until cleanup levels have been achieved.	Institutional controls on land use and water use, as specified in the Base General Plan, will restrict access to the contaminated groundwater throughout WP14. Installation of wells in the contaminated plume for residential, industrial, and agricultural use will be prohibited by the Base General Plan. Clarification on how LUCs (see section 4.3) are implemented.

Record of Decision Component	Explanation of Significant Differences Component
Groundwater will be monitored as indicated by the Decision Guide in Appendix A (Elmendorf AFB, 2003) and evaluated on an as-needed basis to determine contaminant migration and to track the progress of contaminant degradation and dispersion, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.	No difference
Recoverable quantities of free product found on top of the water table at WP14 will be regularly removed during groundwater monitoring events.	No difference
Groundwater monitoring will be discontinued if contaminant levels are below cleanup levels during two consecutive monitoring events. In that case, no further action for groundwater will be required.	No difference
During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements.	No difference, see Table 3.1 for a list of specific constituents to sample and analyze.
All groundwater is expected to be cleaned up within 14 years.	No difference
Soil	
No further action will be required for soil at WP14.	No difference
Source Area LF04	
Groundwater (North/Beach)	
No further action is required for the groundwater at LF04 North/Beach.	No difference

Record of Decision Component	Explanation of Significant Differences Component
Groundwater (South)	
Access to groundwater at LF04 South will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF04 will maintain this designation indefinitely-	Access to groundwater at LF04 South will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use.of contaminated groundwater. Clarification of LUCs (see Section 4.3)
Groundwater will be monitored and evaluated as indicated by the Decision Guide in Appendix A (Elmendorf AFB, 2003) to determine contaminant migration and to track the progress of contaminant degradation and dispersion, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.	No difference
Recoverable quantities of free product found on top of the water table at LF04 will be regularly removed during groundwater monitoring events.	No difference
Groundwater monitoring will be discontinued if contaminant levels are below cleanup levels during two consecutive monitoring events. In that case, no further action for groundwater will be required.	No difference
During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements.	No difference, see Table 3.1 for a list of specific constituents to sample and analyze.
All groundwater is expected to be cleaned up within 14 years.	No difference
Soil (North/Beach)	

Record of Decision Component	Explanation of Significant Differences Component
Access to soil at LF04 North/Beach will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. As a former landfill, LF04 will maintain this designation indefinitely.	Access to soil at LF04 North/Beach will be institutionally controlled. LF04 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Clarification of LUCs (see Section 4.3)
No further action is required for soil contamination at LF04 North/Beach; however, landfill debris on the beach from LF04 will be removed annually as the specific remedy for this area.	No difference
The removal of debris will include all LF04 landfill material which has fallen onto the beach which can be reasonably collected for disposal, as well as debris on the bluff slope or other low lying areas which can be accessed and removed without hazard.	No difference
Hazardous materials encountered during the annual removal events will be handled according to appropriate regulations.	No difference
The removal of debris from the beach at LF04 is expected to continue annually for 30 years or as long as the landfill remains subject to erosional action by tides. Five-year reviews will assess the protectiveness of the remedial action, including an evaluation of any changed site conditions.	No difference
No further action will be required as a means of closing the LF04 landfill.	No difference
Soil (South)	
No further action is required for the soil at LF04 South.	No difference

Record of Decision Component	Explanation of Significant Differences Component
Source Area SD15	
Perched Aquifer Groundwater	
Institutional controls on land use and water use, as specified in the Base Comprehensive Plan, will restrict access to the contaminated groundwater throughout SDl5. Installation of wells in the contaminated plume for residential, industrial, or agricultural use will be prohibited by the Base Comprehensive Plan until cleanup levels have been achieved.	Institutional controls on land and water use, as specified in the Base General Plan, will restrict access to the contaminated groundwater throughout SDl5. Installation of wells in the contaminated plume for residential, industrial, or agricultural use will be prohibited by the Base General Plan. Clarification of LUCs (see Section 4.3)
Groundwater in the perched aquifer at SD15 will be treated by HVE and MNA to remove fuel related contaminants and HVOCs.	No difference
Recoverable quantities of free product found on top of the water table at SD15 will be removed through the HVE process.	No difference
Treated water will be reinjected into the subsurface beyond the boundary of the contaminated aquifer. Reinjected water will be regularly monitored to ensure it meets cleanup and risk requirements.	No difference
Groundwater remaining above cleanup levels will continue to be monitored as indicated by the Decision Guide in Appendix A (Elmendorf AFB, 2003) and evaluated on an as-needed basis to determine contaminant migration and to track the progress of the high-vacuum extraction treatment, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.	A clean-up level for 1,1,2,2-tetrachloroethane has been added (4 µg/L).
When two consecutive groundwater monitoring events indicate contaminant concentrations are below cleanup levels, the HVE system will be shut off. Semi-annual monitoring will continue for another year, and subsurface soil samples will be collected. If levels are confirmed to be below cleanup levels one year after the system was shut off, no further remedial action will be required. If contamination is present in any of the samples, the system will be restarted, or another remedial option will be considered.	HVE will be terminated when operations become ineffective. MNA will be used to reduce groundwater contaminant concentrations to below cleanup levels.

Record of Decision Component	Explanation of Significant Differences Component
During the final round of groundwater monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs and arsenic. These results will be evaluated before a final decision is made that groundwater meets all cleanup requirements.	No difference, see Table 3.1 for a list of specific constituents to sample and analyze.
All groundwater is expected to be cleaned up within five years.	Groundwater cleanup standards are expected to be met at all wells by 2015.
Deep Aquifer Groundwater	
No further action is required for the deep aquifer groundwater.	No difference
Soil	
Shallow soils (less than five feet deep) with contamination above cleanup levels will be excavated, removed, and thermally treated to eliminate fuel-related contaminants. After treatment, no further action will be required for the shallow soils. Shallow soils will also be included in the HVE extraction treatability study (Elmendorf AFB, 2003).	No difference
Deep soils at SD15 will be actively treated through air stripping associated with the high-vacuum extraction process described for the perched aquifer groundwater.	No difference
Soils with contamination above cleanup levels will be sampled one year after system start up and every three years thereafter to evaluate contaminant migration and timely reduction of contaminant concentrations by HVE. If cleanup levels are not being achieved, further remedial action will be evaluated. This will include five-year reviews to assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.	No difference
When two consecutive groundwater monitoring events indicate contaminant concentrations are below cleanup levels, the HVE system will be shut off. Semi-annual monitoring will continue for another year, and subsurface soil samples will be collected. If levels are confirmed to be below cleanup levels one year after the system was shut off, no further remedial action will be required. If contamination is present in any of the samples, the system will be restarted, or another remedial option will be considered.	HVE will be terminated when operations become ineffective. MNA will be used to reduce groundwater contaminant concentrations to below cleanup levels.
All soils are expected to be cleaned up within 5 years.	No difference

Record of Decision Component	Explanation of Significant Differences Component
Source Area LF02	
Groundwater	
Access to groundwater at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF02 will maintain this designation indefinitely.	Access to soil at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use.of contaminated groundwater. Clarification of LUCs (see Section 4.3)
Groundwater will be monitored as indicated by the Decision Guide in Appendix A (Elmendorf AFB, 2003) and evaluated on an as-needed basis to determine contaminant migration and to track the progress of contaminant degradation and dispersion, as well as to provide an early indication of unforeseen environmental or human health risk. Five-year reviews will also assess the protectiveness of the remedial action, including an evaluation of any changed site conditions, as long as contamination remains above cleanup levels.	No difference
Groundwater monitoring will be discontinued if contaminant levels are below cleanup levels during two consecutive monitoring events. In that case, no further action for groundwater will be required.	Clean-up level for 1,1,2,2-tetrachloroethane has been changed from 0.43 µg/L to 4 µg/L.
During the last round of groundwater monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation, including VOCs and SVOCs. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements.	No difference, see Table 3.1 for a list of specific constituents to sample and analyze.
All groundwater is expected to be cleaned up within 23 years.	No difference

Record of Decision Component	Explanation of Significant Differences Component
Soil	
Access to soil at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. As a former landfill, LF02 will maintain this designation indefinitely.	Access to soil at LF02 will be institutionally controlled. LF02 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (e.g., cross country skiing) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use.of contaminated groundwater. Clarification of LUCs (see Section 4.3)
A limited soil cover will be applied in three areas with elevated lead concentrations at LF02. This will eliminate the pathway for contact with the lead contamination. Five- year reviews will be conducted to evaluate the integrity of the cover, evaluate impacts from any changed site conditions, and assess the continued protectiveness of this remedial action.	No difference
Landfill debris on top of or protruding from the ground surface at LF02 will also be removed as part of the specific remedy for this area.	No difference
Hazardous materials encountered during the removal event will be handled according to appropriate regulations.	No difference

Record of Decision Component	Explanation of Significant Differences Component
Source Area LF03	
Groundwater	
Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF03 will maintain this designation indefinitely.	Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use.of contaminated groundwater. Clarification of LUCs (see Section 4.3)
Soil	
Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base Comprehensive Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base Comprehensive Plan. As a former landfill, LF03 will maintain this designation indefinitely.	Access to groundwater and soil at LF03 will be institutionally controlled. LF03 is currently designated as a "restricted use area" in the Base General Plan. This designation provides for recreational use of the parcel (cross country skiing, etc.) and for construction of unmanned facilities such as a parking lot, storage building, or taxiway, but prohibits the construction of any sort of manned facility such as an office building or a residence. Drilling into the shallow aquifer is also restricted by the Base General Plan to prohibit residential or agricultural use.of contaminated groundwater. Clarification of LUCs (see Section 4.3)
Source Area SD73	
Groundwater	
No further action is required for groundwater.	No difference

Record of Decision Component	Explanation of Significant Differences Component
Soil	
No further action is required for soil.	No difference
Source Area SS19	
Groundwater	
No further action is required for groundwater.	No difference
Soil	
No further action is required for soil.	No difference

SECTION 5

AGENCY COMMENTS

No significant comments were received from USEPA and ADEC on the ESD. USEPA and ADEC have agreed to the significant changes included in this ESD.

SECTION 6

STATUTORY DETERMINATIONS

Considering the new information that has been developed, and the changes that have been made to the selected remedies and in accordance with CERCLA Section 121, the lead and support agencies believe that the remedies remain protective of human health and the environment, comply with federal and state requirements that were identified in the ROD and this ESD as applicable or relevant and appropriate to these remedial actions at the time of the ROD, and are cost-effective. In addition, the revised remedies continue to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

SECTION 7

PUBLIC PARTICIPATION COMPLIANCE

In accordance with 40 CFR 300.435(c)(2)(i), USAF will conduct the following public participation activities:

- The ESD and supporting information will be made available to the public in the administrative record established under 40 CFR 300.815 and the information repository (administrative record locations are listed in Section 1.4);
- A notice of availability of this ESD and a summary fact sheet and a brief description of this ESD will be published in prominent local newspapers; and
- The public was made aware of the preparation of this ESD through participation in the Community Environmental Board (CEB) meeting.

SECTION 8

REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2005. *Letter Correspondence Regarding Draft Annual Technical Report SD15 HVE System Elmendorf AFB, AK February 2005*. March 2.

Elmendorf Air Force Base (AFB). 1997. *Final Operable Unit 6 and Source Area SS19 Record of Decision*. United Sates Air Force Elmendorf Air Force Base, Alaska. January.

Elmendorf AFB. 2003. *Memorandum to the Site File Elmendorf Air Force Base Operable Unit 6*. September 19.

Elmendorf AFB. 2005. *2004 Annual Technical Report Environmental Monitoring and System Optimization of SD15 High Vacuum Extraction System*. June.

United States Air Force (USAF). 2003. *Air Force Policy on Performance-Based Record of Decisions (RODs) for Land Use Control (LUC) Implementation*. SAF/IE Memo. 7 October.

United States Environmental Protection Agency (USEPA). 2005. *Letter Correspondence Regarding Elmendorf Air Force Base AK. Draft Annual Technical Report SD15 HVE System. February 2005*. March 23.

FIGURES

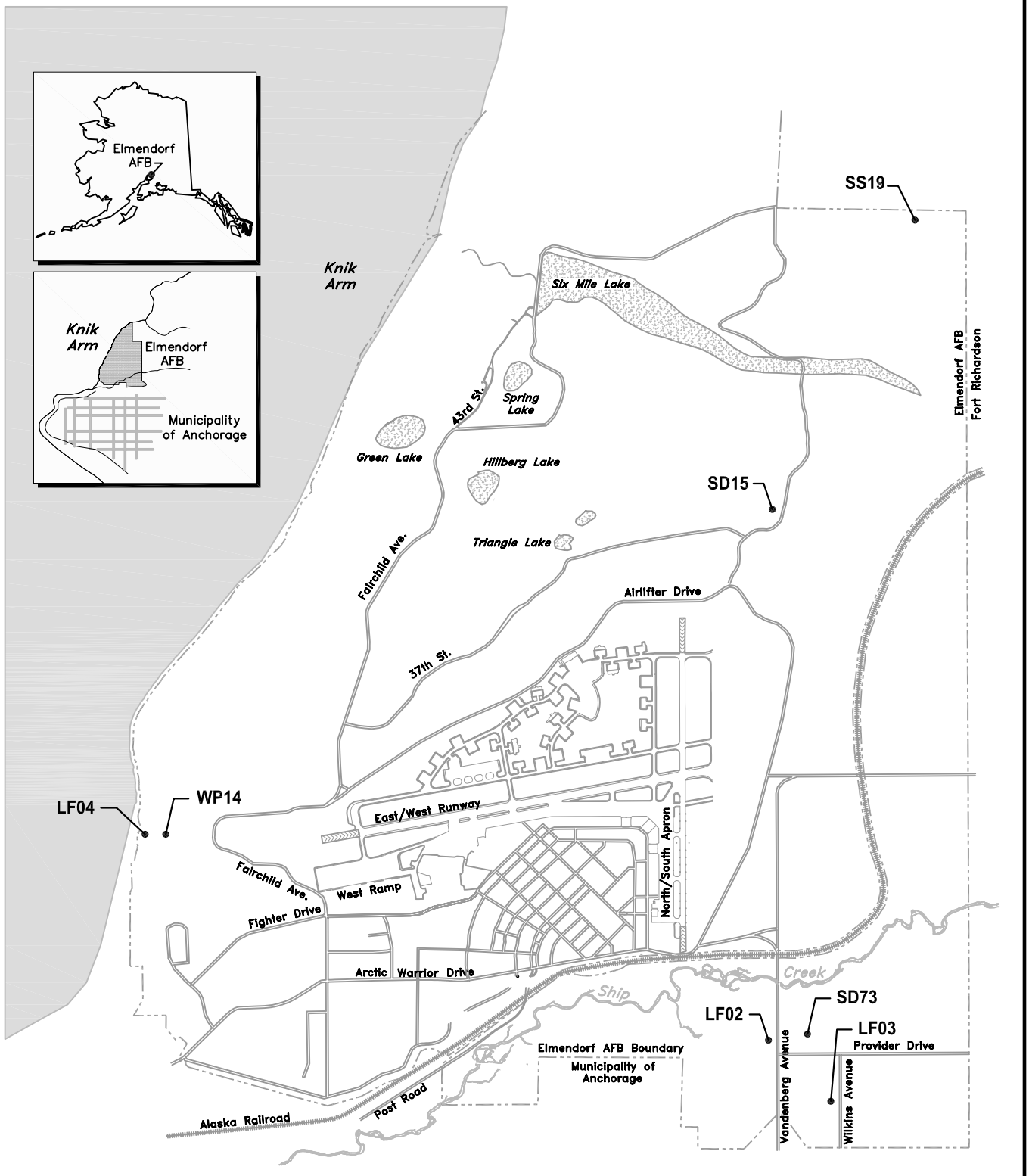


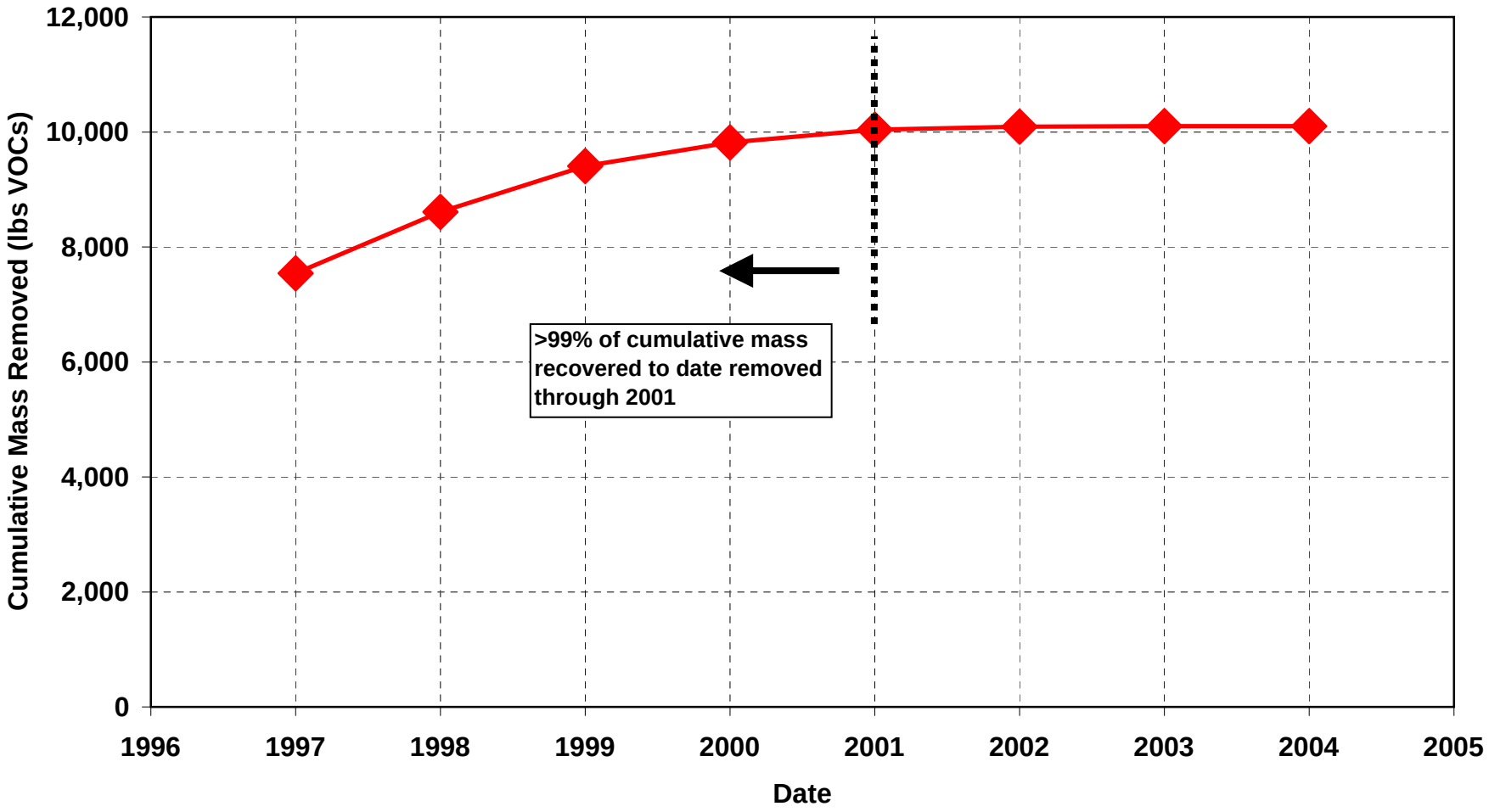
FIGURE 2.1

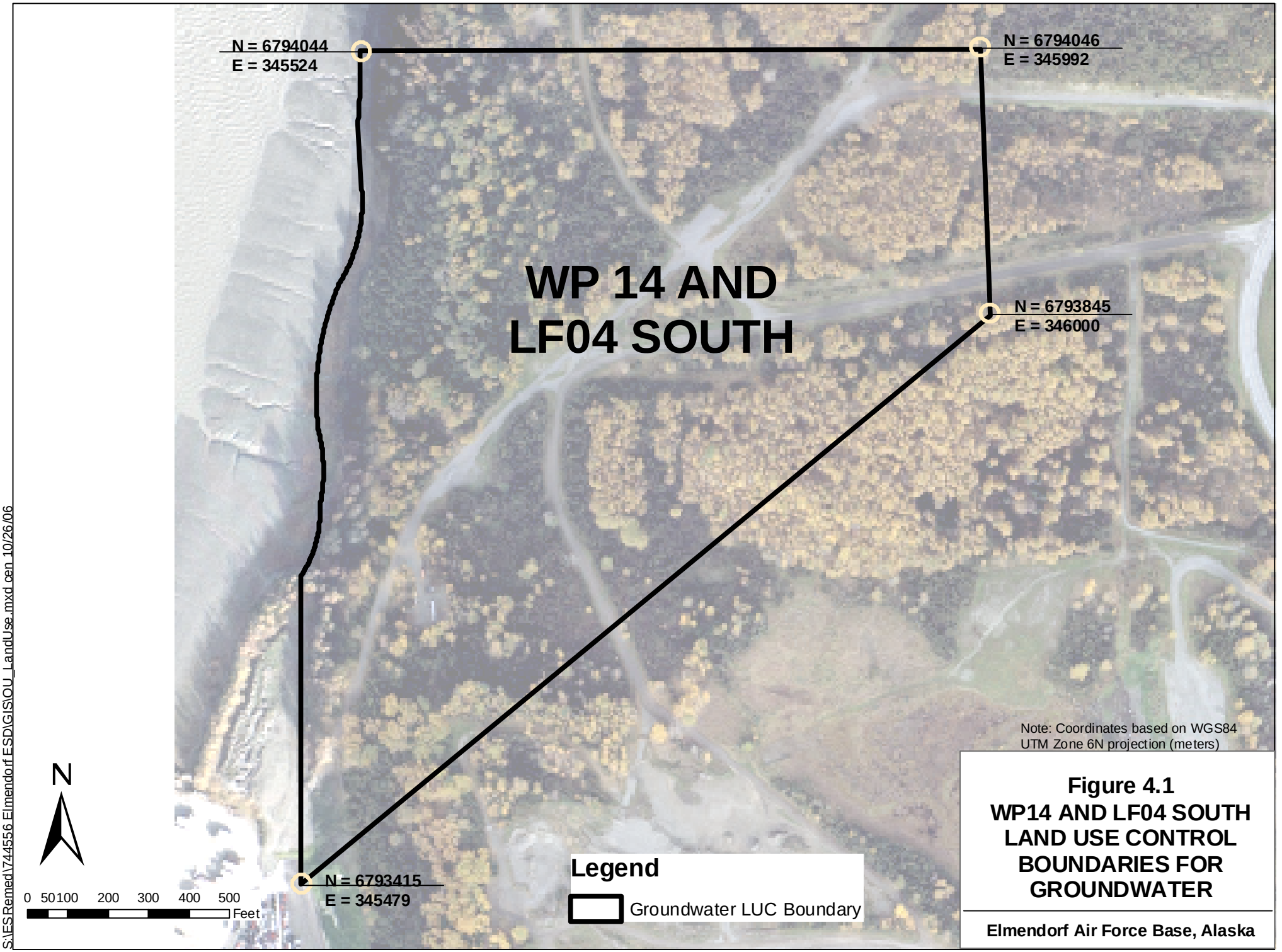
OPERABLE UNIT 6
SITE LOCATION

Elmendorf Air Force Base, Alaska

S:\ES\cad\744556\05dn0334.dwg 12/12/2005 4:34PM JLH

FIGURE 3.1
CUMULATIVE MASS REMOVED (SD15)
OU 6 EXPLANATION OF SIGNFICANT DIFFERENCES
ELMENDORF AFB, ALASKA

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E = 345524
N = 6794046
E = 345992
WP 14 AND
LF04 SOUTH
N = 6793845
E = 346000
N = 6793415
E = 345479
Note: Coordinates based on WGS84
UTM Zone 6N projection (meters)
N
0 50100 200 300 400 500
Feet
Legend
Groundwater LUC Boundary
Figure 4.1
WP14 AND LF04 SOUTH
LAND USE CONTROL
BOUNDARIES FOR
GROUNDWATER
Elmendorf Air Force Base, Alaska
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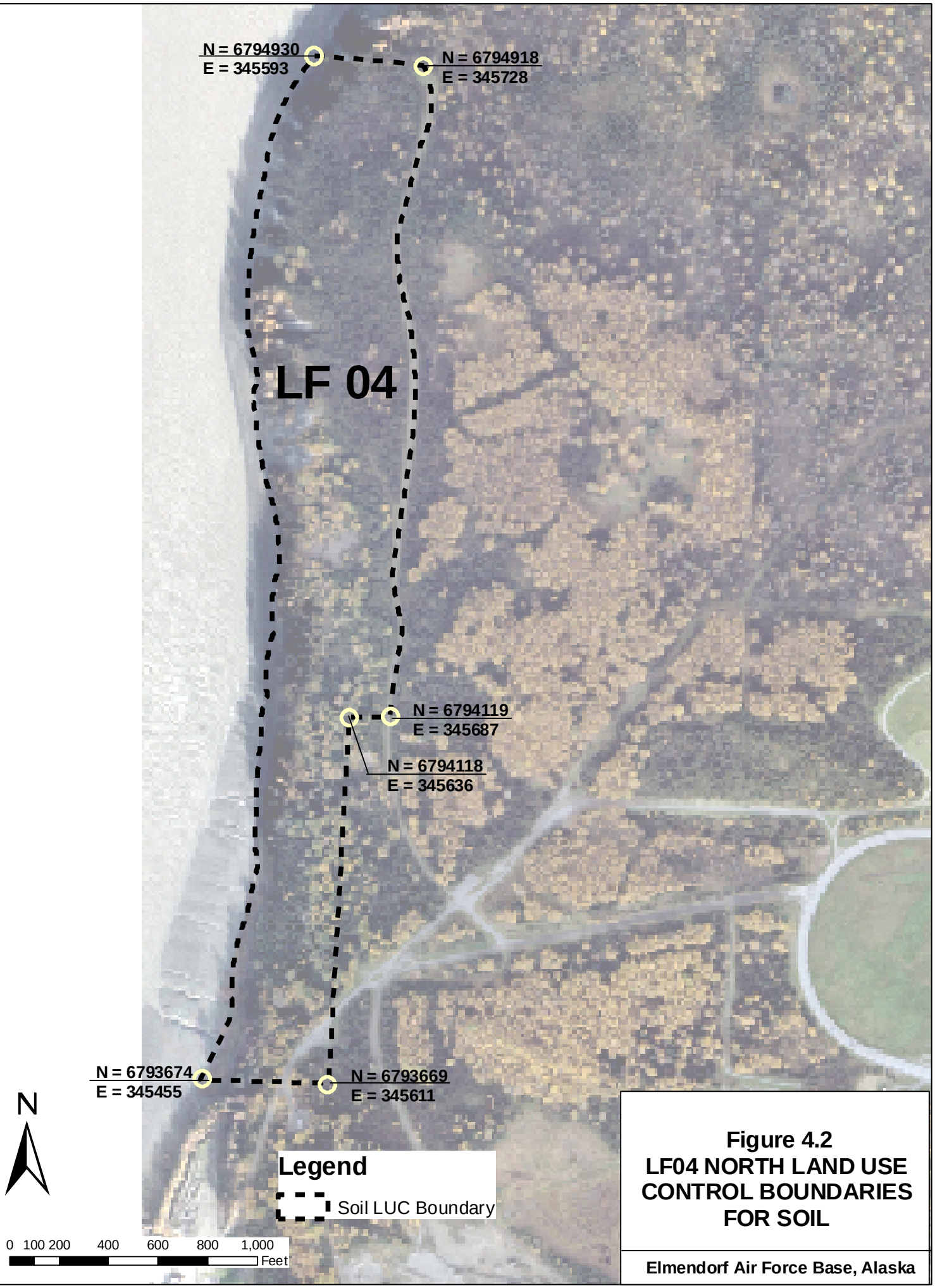

Figure 4.2
LF04 NORTH LAND USE CONTROL BOUNDARIES FOR SOIL

Elmendorf Air Force Base, Alaska

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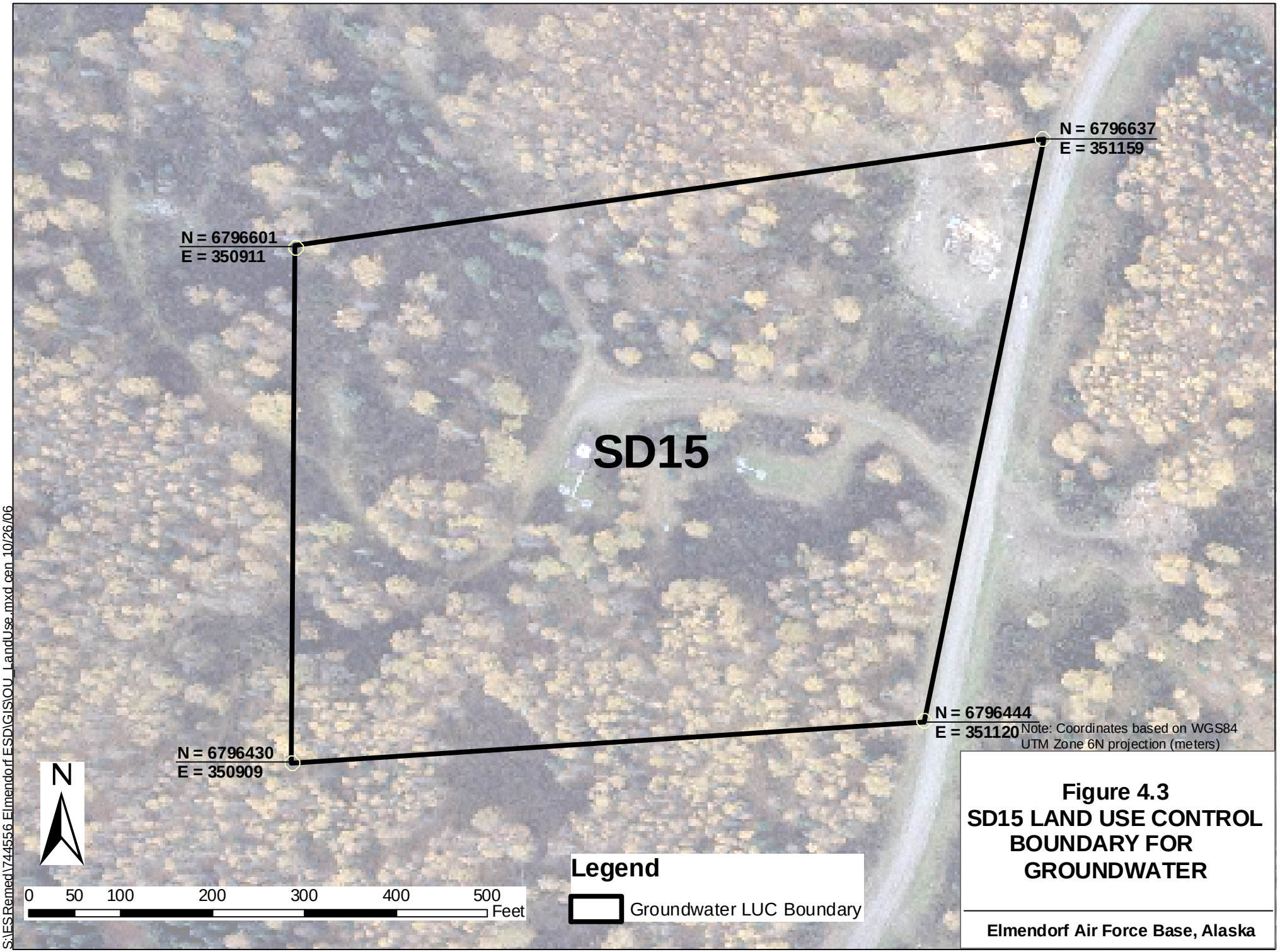
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E = 351159
N = 6796601
E = 350911
SD15
N = 6796444
E = 351120
N = 6796430
E = 350909
Note: Coordinates based on WGS84
UTM Zone 6N projection (meters)
N
0 50 100 200 300 400 500
Feet
Legend
Groundwater LUC Boundary
Figure 4.3
SD15 LAND USE CONTROL
BOUNDARY FOR
GROUNDWATER
Elmendorf Air Force Base, Alaska
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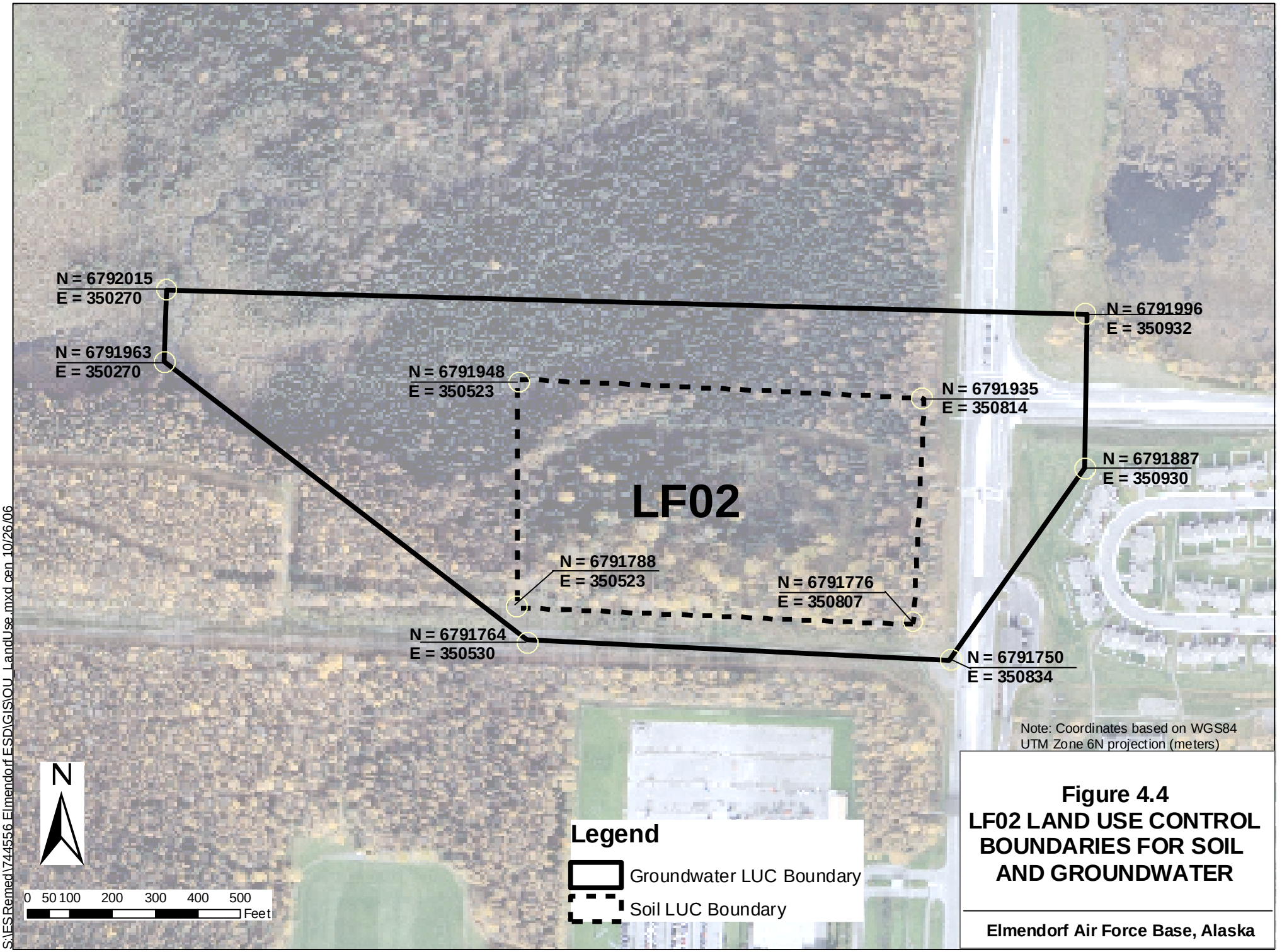
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LF02
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E = 350807
N = 6791764
E = 350530
N = 6791750
E = 350834
Note: Coordinates based on WGS84
UTM Zone 6N projection (meters)
N
0 50 100 200 300 400 500
Feet
Legend
Groundwater LUC Boundary
Soil LUC Boundary
Figure 4.4
LF02 LAND USE CONTROL BOUNDARIES FOR SOIL AND GROUNDWATER
Elmendorf Air Force Base, Alaska
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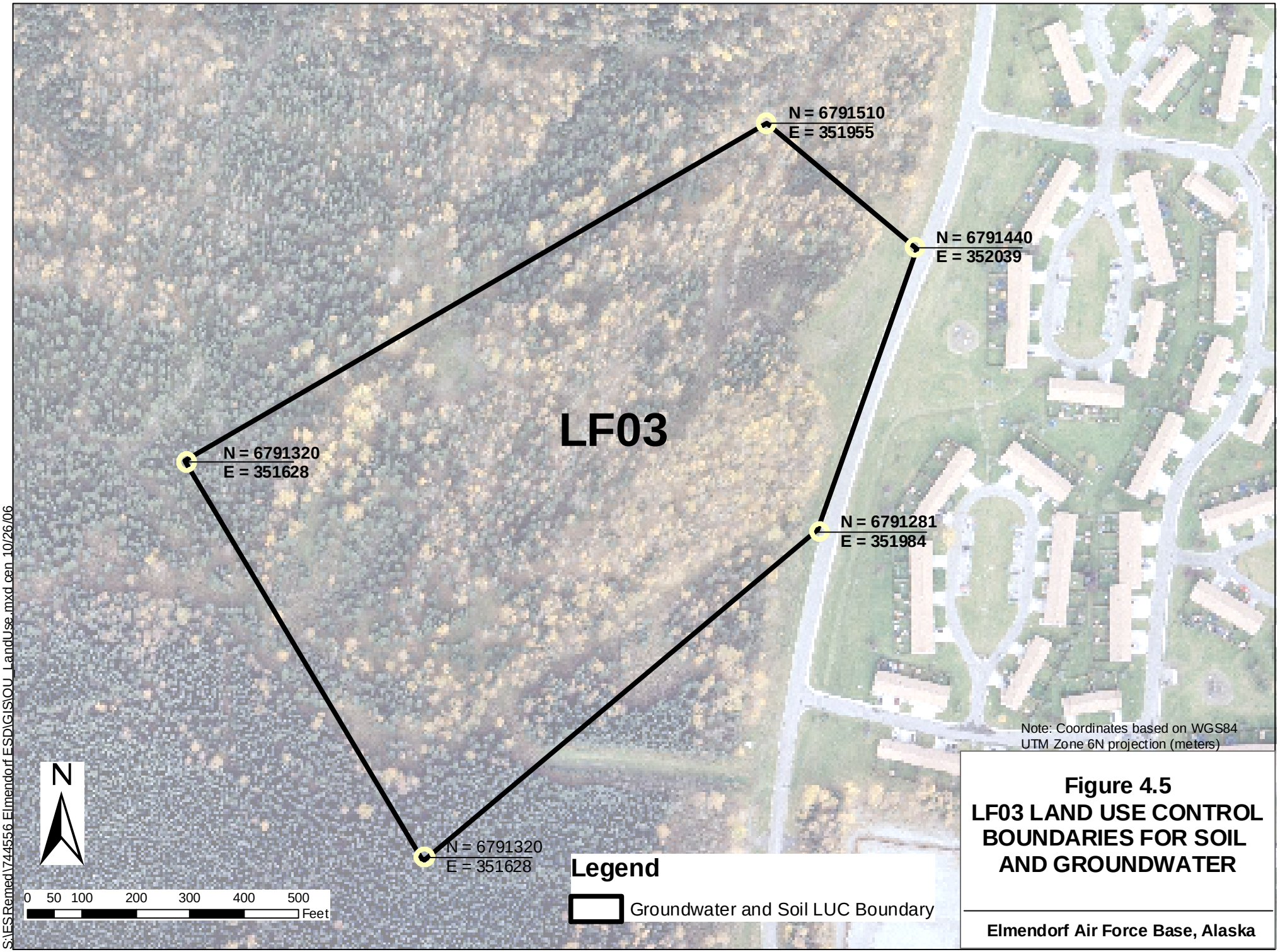
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N = 6791440
E = 352039
LF03
N = 6791320
E = 351628
N = 6791281
E = 351984
N = 6791320
E = 351628
Note: Coordinates based on WGS84
UTM Zone 6N projection (meters)
N
0 50 100 200 300 400 500
Feet
Legend
Groundwater and Soil LUC Boundary
Figure 4.5
LF03 LAND USE CONTROL
BOUNDARIES FOR SOIL
AND GROUNDWATER
Elmendorf Air Force Base, Alaska
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TABLES

TABLE 3.1
CHEMICALS FOUND IN GROUNDWATER AT OU6
Operable Unit 6 Explanation of Significant Differences
Elmendorf Air Force Base, Alaska

Chemical	Contaminant of Concern (Y/N)	Clean-up level In ROD[a/]	1996 MCLs or other Standards	Maximum Concentration listed in RI/FS	Source: ***Remedial Investigation/Feasibility Study Report Operable Unit 6 Final*** **(Elmendorf AFB, 1996)**
WP14	**ROD Requirement:** "During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements."				
Benzene	Yes	5 μg/L	5 μg/L	1390 μg/L	Table 3.6-2 *Summary of WP-14 Groundwater Results Exceeding the Potential Regulatory Levels*
Ethylbenzene	Yes	700 μg/L	700 μg/L	1410 μg/L	
Toluene	Yes	1000μg/L	1000 μg/L	3190 μg/L	
Bis(2-Ethylhexyl)phthalate	No	--	6 μg/L	4,130 μg/L	
Cadmium	No	--	0.005 mg/L	0.00715 mg/L	
LF04	**ROD Requirement:** "During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs, SVOCs, and metals. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements."				
Aldrin	No	--	0.00206 μg/L	0.0243 μg/L	Table 4.6-2. *Summary of LF04 Groundwater Results Exceeding the Potential Regulatory Levels*
Dieldrin	No	--	0.00219 μg/L	0.0324 μg/L	
Benzene	Yes	5 μg/L	5 μg/L	3400 μg/L	
1,2-Dichloroethane	Yes	5 μg/L	5 μg/L	32.6 μg/L	
Ethylbenzene	Yes	700 μg/L	700 μg/L	722 μg/L	
Methylene Chloride	Yes	5 μg/L	5 μg/L	6.53 μg/L	
Toluene	Yes	1000 μg/L	1000 μg/L	3020 μg/L	
Bis(2-Ethylhexyl)phthalate	No	--	6 μg/L	24.2 μg/L	
Benzo(b)fluoranthene	No	--	0.00479 μg/L	0.0819 μg/L	
Cadmium	No	--	0.005 mg/L	0.0628 mg/L	
Vanadium	No	--	0.245 mg/L	0.287 mg/L	
Selenium	No	--	0.05 mg/L	0.0911 mg/L	
Alpha-BHC	No	--	0.00556 μg/L	0.0197 μg/L	

TABLE 3.1
CHEMICALS FOUND IN GROUNDWATER AT OU6
Operable Unit 6 Explanation of Significant Differences
Elmendorf Air Force Base, Alaska

Chemical	Contaminant of Concern (Y/N)	Clean-up level In ROD	1996 MCLs or other Standards	Maximum Concentration listed in RI/FS	Source: *Remedial Investigation/Feasibility Study Report Operable Unit 6 Final* (Elmendorf AFB, 1996)
SD15	**ROD Requirement: "During the final round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs and arsenic. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements."**				
Benzene	Yes	5 μg/L	5 μg/L	1430 μg/L	Table 5.6-2. *Summary of SD15 Groundwater Results Exceeding the Potential Regulatory Levels*
1,2-Dichloroethane	Yes	5 μg/L	5 μg/L	5.92 μg/L	
Ethylbenzene	Yes	700 μg/L	700 μg/L	713 μg/L	
1,1,2,2-Tetrachloroethane	Yes	b/	1.75 μg/L	8.6 μg/L	
Toluene	Yes	1000 μg/L	1000 μg/L	3640 μg/L	
1,1,2-Trichloroethane	Yes	5 μg/L	5 μg/L	6.97 μg/L	
Trichloroethene	Yes	5 μg/L	5 μg/L	143 μg/L	
LF02	**ROD Requirement:** "During the last round of monitoring, samples will be collected and analyzed for all constituents that exceeded MCLs during the 1994 investigation including VOCs and SVOCs. These results will be evaluated before a final determination is made that groundwater meets all cleanup requirements."				
Methylene Chloride	No	--	5 μg/L	7.84 μg/L	Table 8.6-2. *Summary of LF02 Groundwater Results Exceeding the Potential Regulatory Levels*
1,1,2,2-Tetrachloroethane	Yes	0.43 μg/L	1.75 μg/L	45.1 μg/L	
Trichloroethene	No	--	5 μg/L	5.39 μg/L	
Bis(2-Ethylhexyl)phthalate	No	--	6 μg/L	11.8 μg/L	
Selenium	No	--	0.05 mg/L	0.0574 mg/L	
Thallium	No	--	0.002 mg/L	0.0726 mg/L	

[a/] ROD = Elmendorf Air Force Base. 1997. Final Operable Unit 6 and Source Area SS19 Record of Decision. United States Air Force Elmendorf Air Force Base, Alaska, January.

[b/] No numerical remediation goal stated in ROD. Cleanup was considered complete when all the other COCs meet MCLs.